epnoisemap

February 23, 2011

Abstract

This task makes a model image of the background due to PN double events (this is greatest between 200 and 300 eV).

1 Instruments/Modes

Instrument	Mode
PN	Imaging

2 Use

pipeline processing	yes
interactive analysis	yes

3 Description

As in the abstract.

4 Parameters

This section documents the parameters recognized by this task (if any).

Parameter	Mand	Type	Default	Constraints
expcubeset	yes	dataset		

Dataset which contains an exposure map cube. See the **eexpchipmap** task documentation for a description of the format of this file.

outputstyle	no	string	sky	sky—raw

If 'sky', the noise map is output in sky coordinates, to the file referred to by parameter `noiseimageset`. In this case a template set (`templateset`) is needed and the `attstyle` parameter is also read. If

`outputstyle`='raw' on the other hand the output is written to a cube (in the `expcubeset` format) to the file pointed to by `noisecubeset`.

templateset	yes	dataset		

This parameter is read if `outputstyle`='sky'. This file should contain an image in the primary extension, which is used to define the pixel dimensions and World Coordinates of the output image.

noiseimageset	no	dataset	noisemap.ds	

An output image in sky coordinates is written to this file name if `outputstyle`='sky'.

attstyle	no	string	binnedset	binnedset—template

This parameter is read if `outputstyle`='sky'. To convert from chip to sky coordinates it is necessary to know the spacecraft attitude. However the attitude is never completely stable and may vary significantly during an exposure. In this case the nett sky image must be a mosaic of components from different values of the attitude. A time series of attitude values (such as that made either by **attbin** or **evproject**) can be supplied to parameter `binnedattset` if `attstyle` is set to 'binnedset'. If it is judged that the attitude wander during the exposure did not exceed some small fraction of the image pixel dimensions, or if the binned attitude set is not available, then the user may choose to set `attstyle` to 'template' instead. In this case a single fixed value of attitude is read from *_PNT keywords in the template image header.

binnedattset	yes	dataset		

If `attstyle`='binnedset' the user should supply to the present parameter the name of a dataset which contains a time series of the spacecraft attitude variation during the exposure.

noisecubeset	no	dataset	noisemapcube.ds	

An output image cube in chip coordinates is written to this file name if `outputstyle`='raw'.

selexprstyle	no	string	userranges	userranges—dss

Use of task **epnoisemap** implies that the user wishes to model the background component of a real image. To do this properly it is necessary that the noise map and the image reflect the same selection of events, because the PN noise varies markedly with event pattern and energy. It is therefore necessary to provide details of the event selections used to construct the real image. Ideally the user should supply these in the form of the Data Subspace (DSS) of the actual image by selecting `selexprstyle`='dss' and then supplying the file name of the image with the DSS to parameter `dssset`. However it has been found convenient to also allow the user simply to choose to supply a set of energy ranges. This can be done by selecting `selexprstyle`='userranges' and then supplying lists of values to `evlo` and `evhi`. Note that in this circumstance the assumption is made that the original image included double events.

evlo	yes	real list		0 <`evlo`

I `selexprstyle`='userranges', a set of lower energy bounds is read from this parameter. Note that `evlo` and `evhi` must have the same (non-zero) number of elements; the elements of both parameters must occur in increasing order; and no `evlo` value may be $\geq$ than the respective `evhi` value.

evhi	yes	real list		0 <`evhi`

I `selexprstyle`='userranges', a set of upper energy bounds is read from this parameter. Note that `evlo` and `evhi` must have the same (non-zero) number of elements; the elements of both parameters must occur in increasing order; and no `evlo` value may be $\geq$ than the respective `evhi` value.

dssset	yes	dataset		

I `selexprstyle`='dss', information about event selections is sought in a Data Subspace (DSS) of the primary extension of this dataset.

5 Errors

This section documents warnings and errors generated by this task (if any). Note that warnings and errors can also be generated in the SAS infrastructure libraries, in which case they would not be documented here. Refer to the index of all errors and warnings available in the HTML version of the SAS documentation.

dummy *(error)*
**********dummy

6 Input Files

1. (Mandatory) a dataset with an exposure cube (without vignetting) in the primary image extension. The output of task **eexpchipmap** is suitable. A description of the cube format can be found in the documentation of that task.
2. (Only mandatory if `outputstyle`='sky') a FITS dataset, which contains an image in its primary extension. The name of this dataset should be supplied to parameter `templateset`. The output image (`noiseimageset`) is constructed so as to match `templateset`'s pixel dimensions and World Coordinates.
3. (Only mandatory if `outputstyle`='sky' and `attstyle`='binnedset') **attbin** output file, containing a table `ATT_BINS` with columns `TSTOP`, `RA`, `DEC`, `PA` and `IS_GOOD`. The table should also contain a `TIMEZERO` keyword.
4. (Only mandatory if `dssstyle`='dss') A FITS dataset, the name of which should be supplied to parameter `dssset`. The primary extension of this dataset should contain Data SubSpace (DSS) information which describes any relevant event selections. Eg if you want to make a background map to match the event selections used in the construction of an image, you will probably want to supply this image to parameter `dssset` (provided that the image contains the selection specification in the form of a DSS).

7 Output Files

- If `outputstyle`='sky':
  1. `noiseimageset`: an 2-byte-real-valued noise map, in sky coordinates, is contained in the primary image extension.

  This dataset contains the same keywords in the primary HDU as the template image, except for DSS-related keywords. Extra extensions in the template image are not propagated.
- If `outputstyle`='raw':
  1. `noisecubeset`: a noise-map cube is contained in the primary image extension.

  The format of this cube is described in the task documentation of **eexpchipmap**.

8 Algorithm

**********Not yet written.

9 Comments

References